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An Evaluation of Prices and Margins In the California Dairy Industry

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FOREWORD

For more than 25 years, fluid milk prices in California have been fixed by state agency at all levels of production and distribution. The basic legislation concerning justification, intent, and statutory standards was provided in the Young Act and the Desmond Act of the 1935 and 1937 California legislatures, respectively. Since that time, nearly every legislative session has passed amendments designed to clarify or modify the existing standards or their interpretation.

The present report has evolved as a part of an overall appraisal and evaluation of the operation of this milk price stabilization program. It has been designed to evaluate and to compare reported price levels and margins within markets in California with those in other United States cities in order to determine whether the operation of the California milk price stabilization system has had any substantial effect upon the prices received by farmers or those paid by consumers. Two approaches have been used in the study: (1) a cross-sectional analysis in which prices and margins in a large number of markets were compared for specific periods of time and (2) an analysis of eight specific markets, selected for certain existing institutional arrangements, in which price comparisons were made over a considerably longer temporal period.

Reports previously issued in conjunction with the overall analysis of California's milk price regulation system include:

> "An Evaluation of California's Milk Price Stabilization Program: A Summary Report of Progress." Prepared at the request of Governor Edmund G. Brown. This statement summarizes a series of analyses undertaken by a group of researchers under the leadership of D. A. Clarke, Jr., and Olan D. Forker. November, 1964. 25p.

"Some Legal, Policy, and Administrative Aspects of the California Milk Price Stabilization Program" by D. O. Hammerberg. A report prepared for the Giannini Foundation of Agricultural Economics. December, 1965. 59p.

"Some Administrative and Organizational Aspects of the California Milk Price Stabilization Program" by Earl Warner. A report prepared for the Giannini Foundation of Agricultural Economics. December, 1965. 57p.

"A Survey of Competitive Activities Related to Milk Controls in the United States, 1960-1964" by Miriam Revzan. Giannini Foundation of Agricultural Economics. December, 1965. 181p.

"Sales of Fluid Milk to Federal Government Installations in California" by Albert J. Ortego, Jr., and Olan D. Forker. Giannini Foundation of Agricultural Economics. January, 1966. 20p.

Other analyses undertaken in the Giannini Foundation relating to this overall study include:

Analyses of relative profit rates.

An econometric analysis of fluid milk prices in California.

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SUMMARY

Minimum prices for milk used for fluid consumption have been established for both producer and resale levels of trade in California since the late 1930's. This report analyzes and compares the performance of the California industry in terms of price and margin dimensions with the performance of the dairy industry in other United States markets operating under different forms of regulation.

With respect to the public interest aspects of regulation of the dairy industry, this study indicates that performance of the California dairy industyr compares favorably with performance in other fluid milk markets throughout the United States. On the whole, the California price stabilization program appears to have influenced Class I prices to producers in a downward direction. After considering the effect of market size and location from a statistical standpoint, it was found that Class I prices to producers in California were not significantly different from Class I prices established in federal order markets or those observed in unregulated markets and were significantly lower than producer prices in federal-state and other state-controlled markets.

Under present regulations, the level of Class I prices to producers in California appears "reasonable" relative to Class I prices in other markets in the United States. However, any conclusions concerning the level of prices must take into account the quantity of milk such prices will bring forth. While Class I prices in California were found to be as low as or somewhat lower than those in other markets, the supply of milk available for fluid use has nevertheless been more than adequate to meet the fluid milk requirements at current retail prices. It would seem, therefore, that at present

there is no economic basis for increasing the level of Class I prices to producers in California.*

Out-of-store prices for fluid milk in quart containers in California markets were found to be as low as or lower than similar prices in other markets, whether these were regulated by federal orders or other state order programs or operated without governmental regulation. Prices for milk in half-gallon containers were not significantly different in California from those under other regulatory programs.

This study further indicates that under the existing price schedules, processors' margins have been slightly lower in California than in other markets. Nevertheless, the processors' margin appears to have been sufficient to maintain an adequate number of firms in business to process and distribute the supply necessary to meet California market requirements at current prices. Retail store margins on fluid milk, on the other hand, were found to be somewhat higher in California than in other markets and appeared to be unnecessarily large. This suggests the possibility that out-of-store minimum prices could be reduced so that consumers might benefit from the marketing efficiencies of milk distribution through large-volume retail stores.

Finally, according to this comparative analysis, it appears that the elimination of price regulation would result in greater variation (instability) in producer prices and consumer prices as well as in processor and store margins.

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*It should be pointed out that this study did not consider the interrelationships between class prices or the allocation of returns to producers. Although these aspects are important, no implications regarding them can be made here.

AN EVALUATION OF PRICES AND MARGINS IN THE CALIFORNIA DAIRY INDUSTRY

by

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INTRODUCTION

In California, minimum prices for milk for fluid purposes are established at all levels of trade to include wholesale and retail prices as well as producer prices. Although only "minimum" prices, not "maximum" prices, are established, the minimum has become, in almost all instances, the effective price.

Enabling legislation and administrative rules and regulations of the Bureau of Milk Stabilization provide the authority and guidelines for the establishment of appropriate minimum price levels.[1/] Since all prices are set at all levels of trade, margins also are established by regulation. Legislative standards specify that prices and margins should be fair and reasonable.[2/] Absolute norms are not specified, but some are implied. Prices should be high enough to producers to insure an adequate supply of milk to consumers but low enough to be reasonable. How low is reasonable? Low enough to reflect current and potential efficiencies of production and marketing.

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Implicit in the legislation is the intent that margins should be adequate; that is, large enough (1) to maintain in existence sufficient numbers and sizes of marketing firms to receive, process, and distribute the necessary supply; (2) to encourage the development and adoption of better and more efficient techniques; and (3) to maintain and improve product quality and services desired by consumers. At the same time, margins should be low enough (1) to prevent the development of excess capacity; (2) to discourage inefficient firms from remaining in business: (3) to reflect in consumer prices the marketing efficiencies that are achieved; and (4) to avoid monopoly profit to production or distribution.

Minimum prices to producers are determined on the basis of trends in the cost elements involved in producing market milk, together with certain supply and demand factors. Resale prices are established by the administrative agency on the basis of trends in the actual costs of reasonably efficient marketing firms, including a return on invested capital. The established consumer prices are the sum of producer prices and the allowable processing and distribution margins.

This statement, while true, oversimplifies the actual situation. Minimum prices and margins essentially evolve through a complex process of economic analysis and discussion in public hearings, and the decisions made are considered to be within the framework of the law. It is not the purpose of this study to question the action of the administrative agency nor any specific actions of the dairy industry. Rather, its purpose is to evaluate two dimensions of industry performance--prices and margins--as they are influenced by the law.

Two basic approaches may be used to evaluate or appraise the performance of a regulated industry: (1) comparison of an industry under direct control with an ideal norm derived on the basis of optimum conditions of economic theory; or (2) comparison of an industry's performance in a regulated market with that in another market or group of markets subject to different regulations.[3/]

A comparison of actual performance under regulation with a theoretical ideal is satisfactory only for those aspects of performance for which theory provides well-defined criteria for optimum and where available data permit one to estimate the extent to which such conditions exist. For the case at hand, these requirements could not be met; hence, the second approach was used in this study, that is, California markets were compared with other markets subject to different regulations.

Comparisons of prices and margins among several markets and over selected time periods within a specific market are subject to certain limitations. Prices and margins are the results of complex interaction of a number of physical, institutional, economic, and political forces. These include differences among markets in market structure, market size, population density, prices of inputs and their variability, prices and competition from adjacent or nearby markets, and a host of other factors including governmental regulation. Furthermore, the relative importance of these factors may change from time to time and from market to market. As a result of these differing conditions, a specific type of regulation may not have the same impact when applied in different markets. Comparisons of this type cannot be viewed as absolute measures of industry efficiency or potential.

Notwithstanding these limitations, it was felt that the comparative approach would provide a useful basis for general evaluations of the level, trend, and stability of milk prices and margins in California markets relative to those in other markets in the United States. Certainly for those who argue, on a priori grounds, that the primary effect of the California milk price stabilization program has been to "protect" the local industry, the extent of this "protection" should be reflected in the relative levels of prices and margins realized in California as compared with those prevailing in other markets. Therefore, a comparative analysis was made of the prices and margins that have evolved within the operational, legal, and legislative framework of the California milk stabilization program and those that have evolved under different institutional arrangements. The findings of this analysis and the conclusions reached are presented in this report for consideration and use by the industry, the public, the state legislature, and the administrative agency.

Objectives

The specific objectives of this analysis are to:

1. Determine price and margin differences associated with different types of regulation--state, federal, federal-state, California, or none--that is, no price setting by governmental agencies.
2. Compare price and margin trends in California with those in other markets.
3. Compare price and margin stability in California with price and margin stability in other markets.
4. Trace the apparent implications of any differences that are observed.

Procedures

In order to determine what price and margin differences might be associated with different forms of regulation, the observed prices in a large number of markets throughout the United States were subjected to statistical analysis. This was a static or cross-sectional analysis in which prices and margins, as they existed in a particular month, were compared.[4/] In this analysis, an attempt was made to separate statistically the price and margin differences associated with the form of regulation from those existing because of differences in demand or supply conditions, differences in size of markets, or differences in the technical or physical conditions of production or marketing. Each market was classified according to type of regulation and geographical location.[5/] Market size was included as a continuous variable. Analysis of covariance was used to estimate the existing relationships.[6/] Finally, to provide some indication of temporal change, the January data were analyzed for four different years--1955, 1964, 1965, and 1966.

To develop a more detailed temporal comparison, monthly prices and margins for the Los Angeles market were compared with those of seven other selected markets for a period of 16 years--from January, 1948, to May, 1964. Prices and margins were compared for differences in level and movement over time for the purpose of associating observable differences or changes with certain known characteristics of the market. Regression analysis was used to determine general tendencies of level and direction of change. Graphic comparison of actual prices and trends between markets was used to associate known changes in regulation with changes in price levels and margins.

Measurements of stability were developed for the purpose of quantifying differences in magnitude and the frequency of price and margin changes. These measurements of price and margin stability in the various markets were then compared and evaluated.

Data--Source and Definitions

Price data were obtained from the monthly Fluid Milk and Cream Report which provides producer and resale price estimates for fluid milk sold in many of the major cities of the United States.[7/] The terminology used in this study differs somewhat from that used in the Fluid Milk and Cream Report, and some adjustments in the reported data were needed to make the series comparable. The terms used in this study are defined as follows:

1. Producer prices--dealers' buying prices for milk (f.o.b. city) for fluid use adjusted to the milk fat test of the most common grade sold out of stores. These are the effective prices paid producers for milk used for bottling purposes, f.o.b. the distributing plant. The most common grade fat content was used to make margins comparable.
2. Wholesale prices--prices for the most common grade of whole milk (container size specified) delivered in paper. These are the list prices received by distributors for milk delivered to stores without adjustment for discounts since applicable discount rates are not available for all markets.
3. Store prices--consumer prices for the most common grade of whole milk sold out of store (container type and size specified).
4. Home-delivered prices--consumer prices for the most common grade of whole milk delivered to homes in glass containers (size specified) as listed, without adjustment for discounts.

5. Margins--the differences between appropriate price series; also called price spreads. They represent allowances to cover operating costs and return a profit to a particular segment of the industry. The following two kinds of margins are distinguished: (a) processor margin--the difference or spread between the price paid the producer (Class I price) and the wholesale price or price received per quart by the processor and (b) store margin--the difference or spread between the wholesale price paid to the distributer and the store price paid by the consumer.

CROSS-SECTIONAL ANALYSIS

Prices and margins in the milk markets of the United States may differ because of various economic or institutional factors. Prices in a deficit market are expected to be higher than in a surplus market because of the additional cost of moving the needed quantities from the surplus to the deficit market. As a matter of fact, the price needs to be enough higher to bring about such movement. Wage rate differences among markets will probably cause different marketing margins to evolve. Differences in the entire competitive nature of the market may result in different prices and margins among milk markets. These and many other factors will influence and determine price levels and margins independent of the type of price regulation in effect.

Since any one of several forces could cause intermarket differences, analysis of covariance was used in an attempt to isolate the variations in prices and margins associated with location, market size, and the type of regulation in effect. This technique permits a better appraisal of the "net"

differences in prices and margins associated with or related to type of regulation in effect.[8/] Each of the markets, as reported in the Fluid Milk and Cream Report, was identified according to geographic location, size of market, and type of regulation in effect.[9/]

These three variables were treated as independent variables in the analysis and were regressed against the dependent variable, a specific price or margin. In this way, it was possible to estimate the effect of market regulation net of the effect of geographic location and market size.[10/]

Definition of Variables

The independent variables used are defined as follows:

1. Type of market regulation--each market identified as one of the following: (a) federal (markets having a federal milk marketing order), (b) federal-state (markets having some combination of a federal milk marketing order and a state price regulatory system), (c) state (markets having only a state price regulation system, excluding California markets), (d) unregulated (markets with no federal or state governmental price regulation), and (e) California (represented by six California markets--Fresno, Los Angeles, Sacramento, San Diego, San Francisco, and Santa Barbara).

   Although unregulated markets have no minimum prices set at any level of trade, producer prices may be influenced by the level of minimum prices in regulated markets, particularly those nearby. Also, various forms of fair trade laws may influence price levels and margins and price movement in the unregulated market.

In the analysis, the federal order type of regulation was used as a base. The coefficients associated with the other types indicate the magnitude and direction of influence relative to the federal order type.

2. Geographic location of market--markets grouped into nine regions and coded accordingly. The East North Central region was used as a base and all coefficients related to regions indicate net differences above or below that region. Milk markets were grouped according to state location as outlined in Table 1.

3. Size of market--population used to indicate size of market. The 1950 census figures were used to indicate size for January, 1955, and the 1960 census figures were used to indicate relative market size for January, 1964, 1965, and 1966.[11/] Where a standard metropolitan statistical area (SMSA) was defined for a market, this was used as the basis for the population of the market. For most of the markets in each analysis, the SMSA was used for the population estimate. In those markets for which no SMSA was defined, the urbanized area population was used as the population of the market.[12/] Size of market was entered in the analysis as a continuous or quantitative variable.

The dependent variables used--price and margin--have been defined in an earlier section.

TABLE 1

Regions as Defined for Cross-Sectional Analyses
of Fluid Milk Markets, United States

Region	States
New England	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut
Middle Atlantic	New York, New Jersey, and Pennsylvania
East North Central	Ohio, Indiana, Illinois, Michigan, and Wisconsin
West North Central	Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
South Atlantic	Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida
East South Central	Kentucky, Tennessee, Alabama, and Mississippi
West South Central	Arkansas, Louisiana, Oklahoma, and Texas
Mountain	Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada
Pacific	Washington, Oregon, and California

Empirical Results

The cross-sectional analysis relates price and margin variations among a large number of markets to the above three independent variables. Although its main purpose is to obtain estimates of the net differences associated with type of regulation, an explanation of the significance of including the other variables will be of some help in clarifying the meaning of the estimated differences (or coefficients) related to type of regulation.

A location variable was included in the analysis in an attempt to isolate or remove the influences peculiar to a region so that the effects of type of regulation on prices and margins could be more realistically evaluated. The East North Central Region was used as a base because it includes Wisconsin and other markets in the major surplus milk producing region of the United States. This grouping is an attempt to include in a single region those markets that have somewhat comparable conditions of supply and demand. Thus, coefficients related to the region classification reflect price and margin differences associated with regional differences in supply and demand conditions, net of market size, and type of market regulation. A priori one would expect prices to be higher in deficit regions and lower in surplus-producing regions.

The market size variable was included in an attempt to isolate variations due to marketing efficiencies or competitive conditions that may differ because of the size of the market (population) being served. A priori one would expect larger margins in small markets with low operating volumes and smaller margins in large markets where economies of scale and density of delivery are exploited.

The inclusion of the above variables in the analysis explicitly removes or explains variation due to those factors, making it possible to estimate the net effect of type of regulation. Since this is the primary purpose of the

study, only these net differences are described in the text. The coefficients for all these variables are presented in Appendix Tables 1-8.

This method of analysis thus provides measurements of differences that can be used to evaluate partially the reasonableness of California's prices and margins or, in other words, to indicate how the California milk control program of price regulation in itself influences price levels and margins.

Prices Paid to Producers

The estimated coefficients or differences for producer price levels under different types of regulations are presented in Table 2. The tabular values represent the estimated net differences between the price under each of the listed types of regulation and the price under federal orders. Statistical tests indicate whether or not the estimated differences are significantly different from prices under federal order, having taken into account the effect of geographic location and market size (population). Since the primary concern in this analysis is to determine whether or not prices under California regulations are different from prices under other types of regulation, tests were made to ascertain whether the prices under California-type regulations were significantly different from those observed under other types of regulations.[13/]

Also, data for the years 1964, 1965, and 1966 were combined in order to test the hypothesis that the effects of population, type of regulation, and region were equal for each year.[14/] A priori one would not expect the effect of these variables to change over a period of three consecutive years. Based on an F test, the above hypothesis was not rejected for prices paid producers; that is, the effects of these variables on producer prices were not statistically different for the three years. Therefore, the combined analysis for 1964, 1965, and 1966 is used as the basis for comparison of the effects of type of regulation on producer prices in the last three years.

TABLE 2

Relationship Between Types of Market Regulation and Fluid Milk Prices as Reflected by Net Differences from Prices Under Federal Order Regulation
January, Selected Years

Year and type of regulation[a]	Difference from federal order regulation[b]		
	Producer Class I price	Store price	
		Quart[c]	Half gallon[d]
	cents per quart		
1955			
California	-0.442	-0.881	
State (other)	2.189**	1.088*	
Federal-state	2.634**	1.351	
Unregulated	0.287	-0.597	
1964			
California	0.469	-2.100**	-0.699
State (other)	0.843**	-0.812*	1.529**
Federal-state	0.160	-1.018	1.256
Unregulated	0.663	-0.946**	0.493
1965			
California	0.260	-3.130**	-1.290
State (other)	1.155**	-0.707	1.703**
Federal-state	0.547	-0.443	1.476*
Unregulated	-0.023	-1.129**	-0.681
1966			
California	0.202		-1.565
State (other)	0.890**		1.371**
Federal-state	0.901**		1.721*
Unregulated	-0.175		-0.490
1964-1966			
California	0.244		-1.300*
State (other)	0.956**		1.545**
Federal-state	0.561**		1.540**
Unregulated	0.237		-0.242

(Continued on next page.)

TABLE 2--continued

a/ Number of markets in each regulatory category for each analysis is given in Appendix Table 8, p. 62.

b/ Values indicate the amount by which expected prices in markets under the specific type of regulation deviate above (+) or below (-) prices in markets having a federal milk marketing order, having taken into account the effect of region and size of market.

c/ For 1955, data are for one-quart glass containers; for 1964-65, one-quart fibre containers. Data were not analyzed for this size container in 1966.

d/ For 1955, data for half-gallon containers were not analyzed since this size container was of minor importance at that time.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: Calculated.

The estimated coefficients indicate that the producer Class I price in California markets is not statistically different from those which would be expected under federal order (Table 2). However, Class I prices to producers in California markets were significantly lower during 1955 than those which might be expected under other state-type regulations and federal-state regulations.[15/] During 1955, producer Class I prices under the California program were not statistically different from prices in unregulated markets. During the period 1964-1966, Class I prices in California were lower by a statistically significant difference than Class I prices in other state-controlled markets, taking into account the effect of geographic location and market size. During the latter period the Class I prices in California were not statistically different from prices in federal order markets or from prices in unregulated markets. It should be noted, however, that in the period immediately following the time covered by this analysis (1965-66), the Secretary of Agriculture has taken actions which have resulted in a much more rapid increase in Class I prices in other markets of the country than have taken place in California.

Relative to the other types of regulation, it appears that the California program has influenced producer Class I prices in an upward direction in the most recent years included in this study. For example, the estimated effect of California regulations was about 0.4 cent per quart below that which might have been expected under federal order in 1955. In the 1964-1966 period, the estimated effect of California regulations was a Class I price of about 0.2 cent per quart above the price of markets under federal orders. While this effect was not statistically significant during either period, between 1955 and 1964-1966 the estimated difference went from a negative amount to a positive amount. The differential effect of the California program relative to other types of regulation also narrowed between the two periods (Table 2).

In summary, it appears from this analysis that Class I prices to producers established by California regulation were about the same as would be expected if a federal order were operative in California. (Note, however, that this discussion is concerned with the minimum Class I price or the effective price being paid by processors for milk utilized for Class I products and not with blend price differences among markets or individuals.[16/]) California producer Class I price levels are not significantly different from what one would expect if the markets were unregulated. They are, however, lower than would be expected under regulations of the type reflected by federal-state and other state programs in this country.

Relative to other type programs, the California program has influenced producer prices in an upward direction during the period between 1955 and 1964-1966. Relevant to this point is a procedural difference in price setting in California when compared to that used in federal order areas. In California, Class I prices change only following a public hearing at which testimony is presented concerning levels of prices appropriate under current conditions. Federal orders, on the other hand, incorporate prices "generated" as the result of the operation of formulas which may result in price changes as frequent as every month. Most such formulas that set Class I prices involve a premium over current manufacturing milk prices, although "economic type" formulas are used as Class I price movers in some of the federal order markets in the Northeast.

Prices Paid by Consumers

The store price of milk in quart containers appears to be as low as or lower under the California regulatory program than it would be under any other form of regulation, including no regulation, taking into consideration geographic location and market size (Table 2). However, a major portion of

all milk sold through stores is now sold in half-gallon fibre containers rather than in quart containers. The price paid for milk in half-gallon fibre containers also appears to be as low as or lower under California regulations than under other forms of regulations (Table 2).

During 1955, the effect of California regulations on store price in quart containers was not statistically different from such prices under other type regulations. Other state-type regulations had an upward influence on store quart prices relative to prices under federal orders in 1955. During 1965, store prices for milk in fibre quart containers were statistically lower under California regulations than such prices under federal order, other state, and federal-state regulations. These prices, however, were not statistically different from prices observed in unregulated markets. Between 1955 and 1965, it appears that the California regulations had a downward influence on store prices in quarts relative to other types of regulations.[17/]

During the 1964-1966 period, the differential influence of California regulations on the store price of milk in half-gallon containers was significantly downward relative to that of other state, federal-state, and federal order regulations.[18/] There was no significant difference between the differential influence of California program and no regulation.[19/]

In summary, on the basis of this comparative analysis, the current effective regulation in California seems to result in consumer prices which are as low as or lower than prices which might be expected if the California dairy industry operated under other forms of regulation or without governmental price regulation. Relative to other regulation types, the net effect on prices of the California form of regulation appears to have been more beneficial to consumers during the latter period than they were in 1955.[20/]

Processor Margins

The differential influence of the California program on spread between prices processors pay for raw milk for fluid use and what they receive at wholesale in quart containers appears to be downward or no different from the effect of other types of regulation (Table 3). All forms of regulation considered resulted in downward effects for processor margins for quart containers in both 1955 and 1964 relative to the effect on margins indicated for a federal order program.[21/] However, in 1955 only the effect of no regulation was significantly different from federal orders. During both 1955 and 1964, the California regulation gave an estimated coefficient that was lower than all other types. However, in neither period were these differences significantly different from zero; but the type of regulation, region, and size of market (population) did not explain a very large proportion of the variation in processor margins in various markets in the United States.[22/]

During the 1964-1966 period, for milk sold in half-gallon containers, the influence of California regulation on processor margins was downward. The downward influence indicated for California regulations was statistically significant from all other type regulations, including no regulation (Table 3). Also, both state and federal-state type regulations were significantly upward relative to federal order regulation.

Hence, on the basis of these analyses, the California program has resulted in processor margins lower than those which might be expected under other types of controls. While the gross processor margin does not provide a measure for comparison of profitability or of actual processing efficiencies, it gives an indication that the California program has not allowed processors to exploit consumers or producers in terms of unreasonable processing margins when compared

TABLE 3

Relationship Between Types of Market Regulations
as Reflected by Net Differences in Margins
January, Selected Years

Year and type of regulation[a]	Difference from federal order regulation[b]			
	Processor margins		Store margins	
	Quart[c]	Half gallon[d]	Quart[c]	Half gallon[d]
	cents per quart			
1955				
California	-1.201		0.591	
State (other)	-0.474		-0.328	
Federal-state	-0.559		-0.125	
Unregulated	-1.011**		-0.029	
1964				
California	-2.610**	-1.862*	0.173	1.074
State (other)	-1.478**	0.530	-0.277	0.559
Federal-state	-0.746	1.033	-0.361	0.603
Unregulated	-0.977	-0.086	-0.572	0.275
1965				
California		-2.284*		0.888
State (other)		0.391		0.206
Federal-state		0.678		0.102
Unregulated		-0.165		0.494
1966				
California		-1.211		0.288
State (other)		1.090**		-0.457
Federal-state		0.633		-0.274
Unregulated		0.319		-0.011
1964-1966				
California		-1.970**		0.832
State (other)		0.663**		0.070
Federal-state		0.871*		0.119
Unregulated		-0.097		0.268

(Continued on next page.)

TABLE 3--continued.

a/ Number of markets in each regulatory category for each analysis is given in Appendix Table 8, p. 62.

b/ Values indicate the amount by which expected prices in market under the specific type of regulation deviate above (+) or below (-) prices in markets having a federal milk marketing order, having taken into account the effect of region and size of market.

c/ For 1955, data are for one-quart glass containers: for 1964, one-quart fibre containers.

d/ For 1955, data for half-gallon containers were not analyzed since this size container was of minor importance at that time.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: Calculated.

to other types of governmental regulation. Furthermore, relative to other type regulations, processor margins under the California program appear to have declined between 1955 and 1964.

Store Margins

Store margins in the various fluid milk markets do not appear to be closely related to type of regulation, geographic location, or size of market. These factors explained only a small proportion of the variation in store margins during all periods considered.[23/] There was no statistically significant difference in store margins between any of the various types of regulation considered.[24/] Although not significantly different, the influence of the California program on store margins was upward in all analyses made, both for quart and half-gallon containers.

The prices used to develop these margins do not include volume discounts at either the wholesale or retail level. If volume discounts are generally larger under one type of market regulation than under others, then the measurement developed here may be biased accordingly. Volume discounts at wholesale levels are considered large in California and apply to a large proportion of the milk sold to consumers. Out-of-store discounts exist but are minor. The volume discount schedule typical in California markets is presented in Figure 1.

The prices used in this study are base prices: 22 cents to retailer and 24 cents out of store. Stores that purchase in large volumes and on the basis of limited service realize a much larger margin than smaller volume stores. Thus, our analysis underestimates the magnitude of store margins and results in an understatement of the effect of the California program on store margins.[25/]

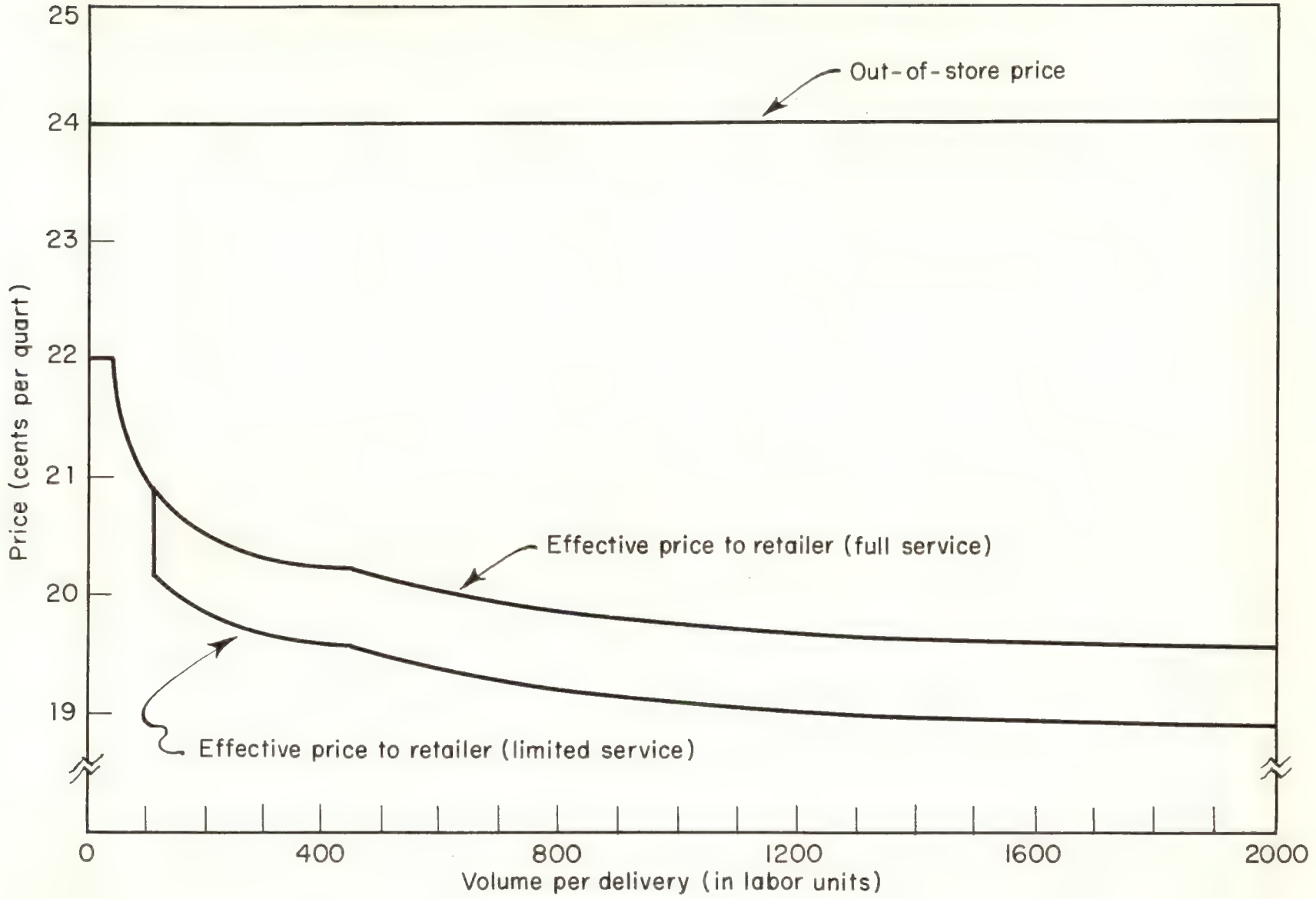

FIGURE 1. Comparison of Out-of-Store Price for Fluid Milk with Effective Price to Retailer, Southern Metropolitan Marketing Area, California, Zone 1, 1964

Source: California Department of Agriculture, Bureau of Milk Stabilization, Minimum Wholesale and Minimum Retail Prices, as Amended for Fluid Milk, Fluid Cream, Fluid Nonfat Milk and Fluid Low Fat Milk, Southern Metropolitan Marketing Area (effective January 1, 1963)

The apparent higher store margin due to the California program does not necessarily mean that prices to consumers are higher than they are in markets having different forms of regulation. The analysis indicates only that store margins appear to be higher under the California program than they might be under one of the other forms of regulation. That consumer prices would be lower without a minimum resale price program cannot be directly inferred. However, the higher store margin does imply that the benefits of efficiencies existing in the production or marketing of milk in California above those existing elsewhere are accruing to the retail store sector of the industry in the form of higher margins and probably higher profits from the sale of milk.

Under a form of regulation without resale price control, or with a different form of resale price control, margins might be differently distributed; and, conceivably, if marketing efficiencies are greater in California markets than in others (as implied by the lower processor margin), then consumer prices might be somewhat lower. Realistically though, one would expect that under a different program some of the higher store margin would probably be absorbed by processors, some would stay with the stores, and some would go to consumers in the form of lower prices.

COMPARATIVE ANALYSIS OF SELECTED MARKETS

The analysis to this point has provided some insight into the overall situation by observing the average performance of a large number of markets. This section takes a more detailed look at price and margin movements in eight selected markets over a period of 16 years. Comparative analysis was made of monthly price series for the period of January, 1948, through May, 1964.[26/]

Trend lines, developed by least-squares regression with price or margin as a function of time, are presented to indicate differences in average prices, differences in the magnitude of the average rate of change, and the general direction of change. The purpose is to compare price and margin movements and trends of a California market with those of markets having specific known regulatory conditions.

The Markets Studied

The markets and the reasons for their selection are listed below.

The California Market: Los Angeles.--The Los Angeles market is the largest fluid milk market in California. Minimum prices have been established by the California Bureau of Milk Stabilization at all levels of trade and have been effective in Los Angeles continuously since 1940. Although price levels are not the same in all California markets, they do normally move concurrently and maintain relatively constant differentials.

Continuous Federal Control: Chicago, Illinois.--The Chicago market has been regulated by a federal milk marketing order for the entire period under consideration. Resale prices have not been regulated. The Class I price to producers is based on manufacturing milk prices and contains a supply-demand adjuster that "moves" prices in response to changes in the production-consumption balance. Negotiated premiums above the market order price have been common in recent years.

Continuously Unregulated Market: Houston, Texas.--The Houston milk market has been free of governmental price regulation during the period. This market has been characterized by a strong milk producers' association which controls nearly the entire milk supply for the market.

Sequence of State Then Federal Control: Hartford, Connecticut.--Hartford was selected as an eastern market that has been under both state and federal regulation. The Hartford market has been regulated by the Connecticut federal milk marketing order since April 1, 1959. Prior to that time, minimum prices to milk producers were established by state regulations. In the period under analysis (1948-1964), there have been no resale price regulations in this market. The present federal order regulating producer prices in Hartford contains a market-wide pool, and the Class I price is based on an economic index with a supply-demand adjuster.

Sequence of Unregulated Then Federal Control: Salt Lake City, Utah.--The Salt Lake City market was selected as a market in the western region which was unregulated during part of the time under consideration and regulated by a federal milk marketing order during the remainder of the period. Salt Lake City is part of the Great Basin federal order which became effective November 1, 1959. This marketing order contains a market-wide pool, and Class I prices are determined on the basis of manufacturing milk prices and contain a supply-demand adjuster. There is no resale price control.

Intermittent State Control: Portland, Oregon.--Both minimum producer and resale prices were established under the Oregon Milk Marketing Act from the 1930's until November 6, 1954, when the enabling act was repealed. From 1957 to June, 1961, the Oregon Department of Agriculture was permitted to audit the records of milk distributors in order to verify that producers had been properly paid for milk received, but no prices were established by regulation. For the period June 1, 1961, through December, 1962, minimum producer prices for Class I uses were established. Since January 31, 1964, payment to producers has been made on the basis of a statewide pool and individual allotments or quotas have been applied.

Intermittent Resale Price Control: Atlantic City, New Jersey.--The Atlantic City market is characterized by intermittent periods of resale price regulation by the state of New Jersey. Class I prices to producers had been established by state regulation until December 1, 1963, when this area became a part of the Delaware Valley federal milk marketing area. Resale price regulations in Atlantic City were suspended during the periods January 1, 1949, through April 30, 1953; February 15, 1955, through June 30, 1956; and October 20, 1962, through December 9, 1962. During all other periods, resale prices were established by the New Jersey Office of Milk Industry.

Intermittent State Control and Federal Control: Miami, Florida.--The Miami market has been regulated by federal order since September, 1957. Prices to producers under this order are specified in the order; that is, the price is not based on a formula. Allocation of proceeds to producers is on the basis of a market-wide pool. Prior to the federal order, producer prices were established by state regulation until January, 1956. Wholesale and retail prices were established by state regulation until January, 1956. Wholesale and retail prices were established by state regulation from 1955 to 1957 but were not enforced. This lack of enforcement had a strong bearing on the withdrawal of the Miami area from state supervision in favor of regulation under a federal milk marketing order.[27/]

Trends in Prices and Margins

Prices Paid to Producers

Comparison of the Class I price levels in the eight markets studied indicates that only the Chicago market had Class I prices consistently below the Los Angeles prices (Figure 2). Here are shown the average relationships of Class I prices in these markets over time, expressed in linear terms.

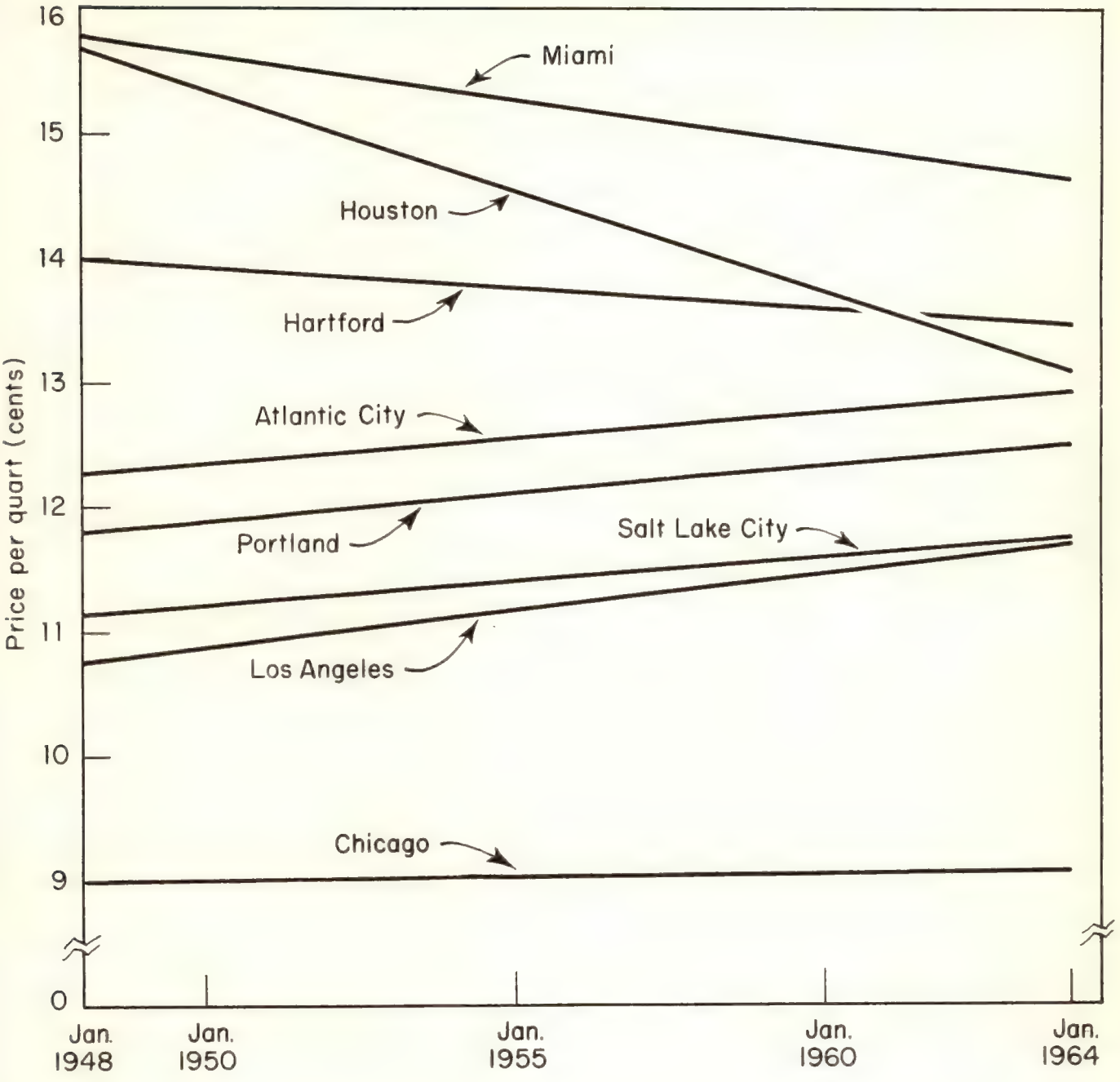

FIGURE 2. Linear Trends of Producer Class I Prices for Fluid Milk Selected Markets, 1948-1964

Source: Data for least-squares estimation of linear trends were obtained from U.S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948 — May, 1964, monthly issues, Table 1.

While the Los Angeles Class I price was generally lower than that for all other markets except Chicago, it has increased at the most rapid rate (Figure 2 and Table 4). Of significant importance is the apparent tendency for Class I prices in these markets to converge over time.[28/]

Chicago prices, which have evolved under a system of federal order pricing and negotiated premiums above the federal order formula price, have varied most and showed no significant time trend. Class I prices in the Chicago market were most stable during the latter part of the period when the negotiated prices were the effective prices.

Two markets, Houston and Miami, showed a downward trend in Class I prices over the period analyzed. It should be noted that these two markets had the highest Class I prices of all the markets considered. The periods of change in the regulatory procedures in Miami and Portland have been associated with changes in the type and magnitude of price variations as the industry apparently anticipated the influence of the order and/or as the order became effective. Price movements have been more frequent (to a degree representing seasonal movements) in the Hartford market since Connecticut came under the formula-pricing technique of that federal order. The federal order in the Salt Lake City market has effectuated a more stable price level.

Consumer Prices

Out-of-Store Prices.--The price paid for milk out of grocery stores in Los Angeles has generally been lower than in any of the other seven markets studied (Figure 3). Although prices in Salt Lake City were slightly lower early in the period of analysis, they have increased at a faster rate. Prices in Houston (an unregulated market) and Miami (resale price regulation until late 1957) have increased at slower rates than the others, but it should be noted that these

TABLE 4

Trends in Producer Class I Prices, Selected Milk Markets
United States, January, 1948-May, 1964

Market	Average price[a]	Regression results[b]		
		Constant term $\hat{a}$	Trend coefficient $\hat{b}$	Coefficient of determination[c] r^2
	cents per quart			
Los Angeles	11.2	10.7	+.0048**	.15
Chicago	9.0	9.0	+.0005	.00[d]
Houston	14.4	15.7	-.0133**	.46
Hartford	13.7	14.0	-.0027**	.04
Salt Lake City	11.4	11.2	+.0030**	.07
Portland	12.2	11.8	+.0034**	.04
Atlantic City	12.6	12.3	+.0033**	.08
Miami	15.2	15.8	-.0059**	.44

a/ Simple average over entire time period.

b/ Computed on assumption of linear trend:

$$p_t = \hat{a} + \hat{b}t + \hat{e}_t$$

where

$\hat{a}$ = general level of prices at the start of the period

$\hat{b}$ = average increase (+) or decrease (-) in price per month

$\hat{e}_t$ = portion of observed price which is not associated with the linear trend in price = $p_t - \hat{a} - \hat{b}t$

and

r^2 = coefficient of determination.

Values for $\hat{a}$ and $\hat{b}$ were obtained by least-squares regression.

(Continued on next page.)

TABLE 4--continued.

c/ The low r^2 values indicate that while most of the markets had a significant time trend in producer prices, these prices varied considerably from this trend. Such variation is due to factors other than trend in the general level of milk prices. Since prices in most of the markets were established by regulation, it is assumed the regulatory agency concerned itself with many factors in establishing Class I prices.

d/ Actual value, 0.001.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

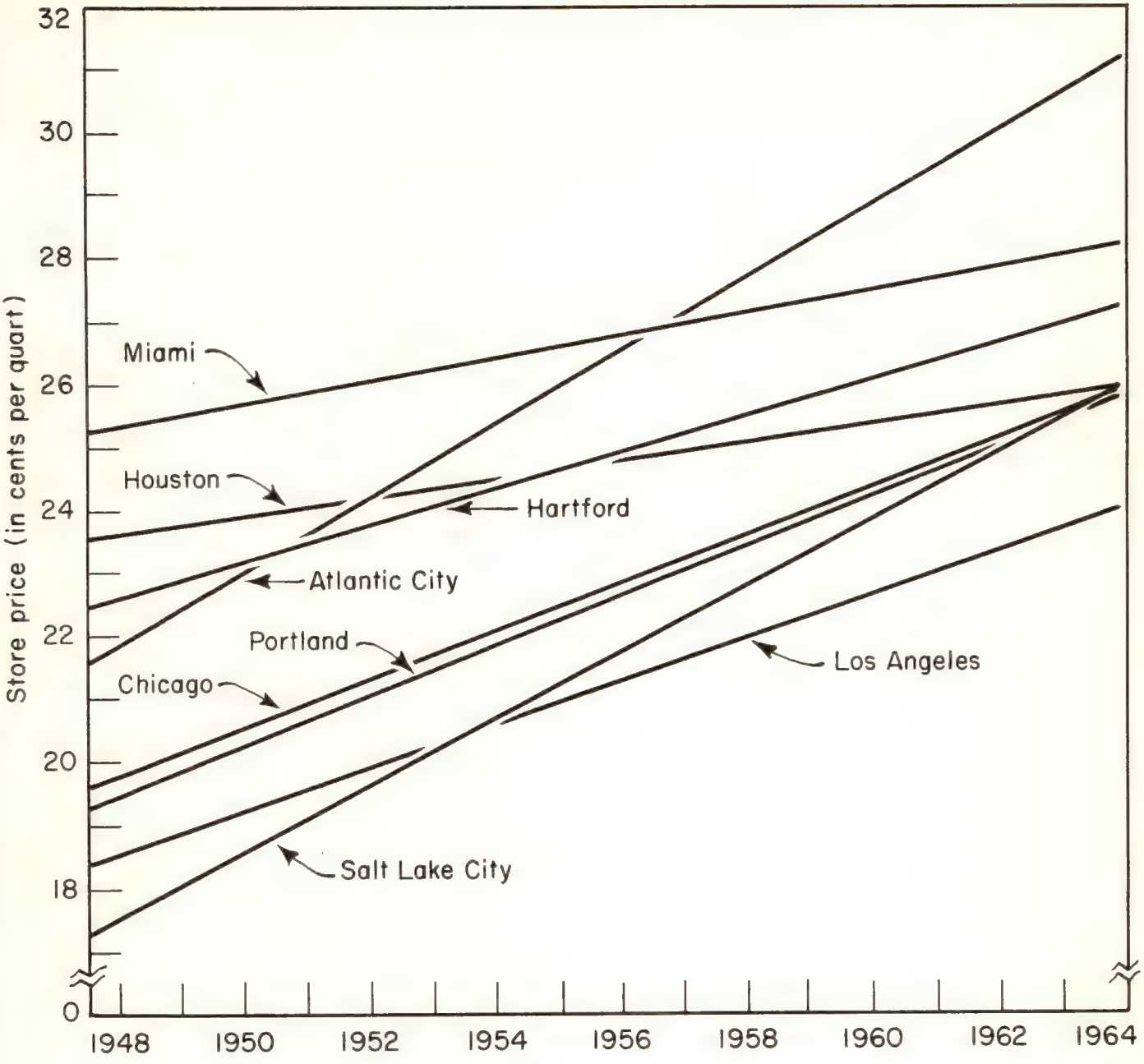

FIGURE 3. Linear Trends of Consumer Store Prices for Fluid Milk Selected Markets, 1948 – 1964

Source: Data for least-squares estimation of linear trends were obtained from U.S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948 – May, 1964, monthly issues, Table 1.

prices initially were at a higher level. Consumer prices in Atlantic City have increased at the fastest rate (.048 cent per quart per month) (Table 5).

In general, it appears that out-of-store consumer prices have been lower in Los Angeles than in any of the other markets during most of the months of the period studied when measured for sales in quart containers. Average prices have been lowest--21.1 cents per quart--and the rate of increase slower than in three markets and greater than in the other four markets.

The general movement of prices in Los Angeles has been similar to that in Chicago but generally at a lower level and with fewer changes since actual prices in the Los Angeles market are usually the minimum prices changed only on order of the Director of Agriculture after formal hearings.

Consumer prices generally increased in Miami after resale control was set aside. However, in Oregon--following the abolishment of resale price control in 1954--store prices immediately declined 1 cent per quart but then gradually increased and from 1956 to date generally have remained from 1 to 2 cents above the price paid by consumers in Los Angeles.

Consumer prices in Atlantic City were not reported during the periods when resale price control was suspended, supposedly because there were so many different prices that it was impossible to determine an average price for each month. However, after resale price regulation was removed in January, 1964, the quoted consumer price for quarts out-of-stores decreased 6 cents per quart and remained at that level through May, 1964.

These data do not support the often posed argument that the California milk-control program exploits consumers and forces them to pay prices higher than in other milk markets. Even in Chicago, where producers have consistently received less for milk used for fluid purposes, the price to consumers has

TABLE 5

Trends in Consumer Store Prices for Fluid Milk, Selected Milk Markets
United States, January, 1948-May, 1964

Market	Average price[a/]	Regression results[b/]		
		Constant term $\hat{a}$	Trend coefficient $\hat{b}$	Coefficient of determination r^2
	cents per quart			
Los Angeles	21.1	18.3	+.028**	.79
Chicago	22.7	19.6	+.032**	.60
Houston[c/]	24.7	23.5	+.012**	.10
Hartford	24.8	22.4	+.024**	.34
Salt Lake City	21.5	17.2	+.043**	.94
Portland	22.5	19.2	+.033**	.82
Atlantic City[c/]	26.3	21.5	+.048**	.63
Miami	26.7	25.2	+.015**	.47

a/ Simple average over entire time period.

b/ Computed on assumption of linear trend:

$$p_t = \hat{a} + \hat{b}t + \hat{e}_t$$

where

$\hat{a}$ = general level of prices at the start of the period

$\hat{b}$ = average increase (+) or decrease (-) in price per month

$\hat{e}_t$ = portion of observed price which is not associated with the linear trend in price = $p_t - \hat{a} - \hat{b}t$

and

r^2 = coefficient of determination.

Values for $\hat{a}$ and $\hat{b}$ were obtained by least-squares regression.

c/ Houston and Atlantic City markets are based on 125 and 130 observations, respectively. The average price computed for these markets is the trend value for the middle month of the entire period.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

generally been higher than the Los Angeles price and has averaged over 1.5 cents per quart higher for the 16-year period.

Home-Delivered Prices.--The price to consumers in Los Angeles for home-delivered milk has been lower than in any other market studied except Salt Lake City (Figure 4). For the entire period, Salt Lake City consumers paid an average of 0.4 cent less than Los Angeles consumers, while Atlantic City consumers paid an average of almost 5 cents per quart more (Table 6).

Prices have been increasing faster in five markets and more slowly in two markets than in Los Angeles.

Comparison of monthly price levels and movements indicates that consumers in Los Angeles paid about the same price or less for milk delivered to their home than did consumers in the other markets during the entire time period.

It appears that abolishment or suspension of resale price control does not have the same effect on home-delivered prices as on store prices. Movement of home-delivered milk prices appeared to be about the same during periods of resale control as during periods without resale control in Atlantic City, Miami, and Portland.

Processor Margins

Average processor margins for milk sold to stores in quart containers were lowest in Los Angeles and Salt Lake City (Table 7). Although margins in Salt Lake City and Houston were lower initially, margins in Los Angeles increased at a much slower rate so that by the end of the period under study Los Angeles processor margins were the lowest (Figure 5). Only Miami shows a slower rate of increase in margins than Los Angeles.

Margins in Los Angeles, as a result of the resale price-setting procedure, increased gradually over the 16-year period by increments of 1/2 cent per

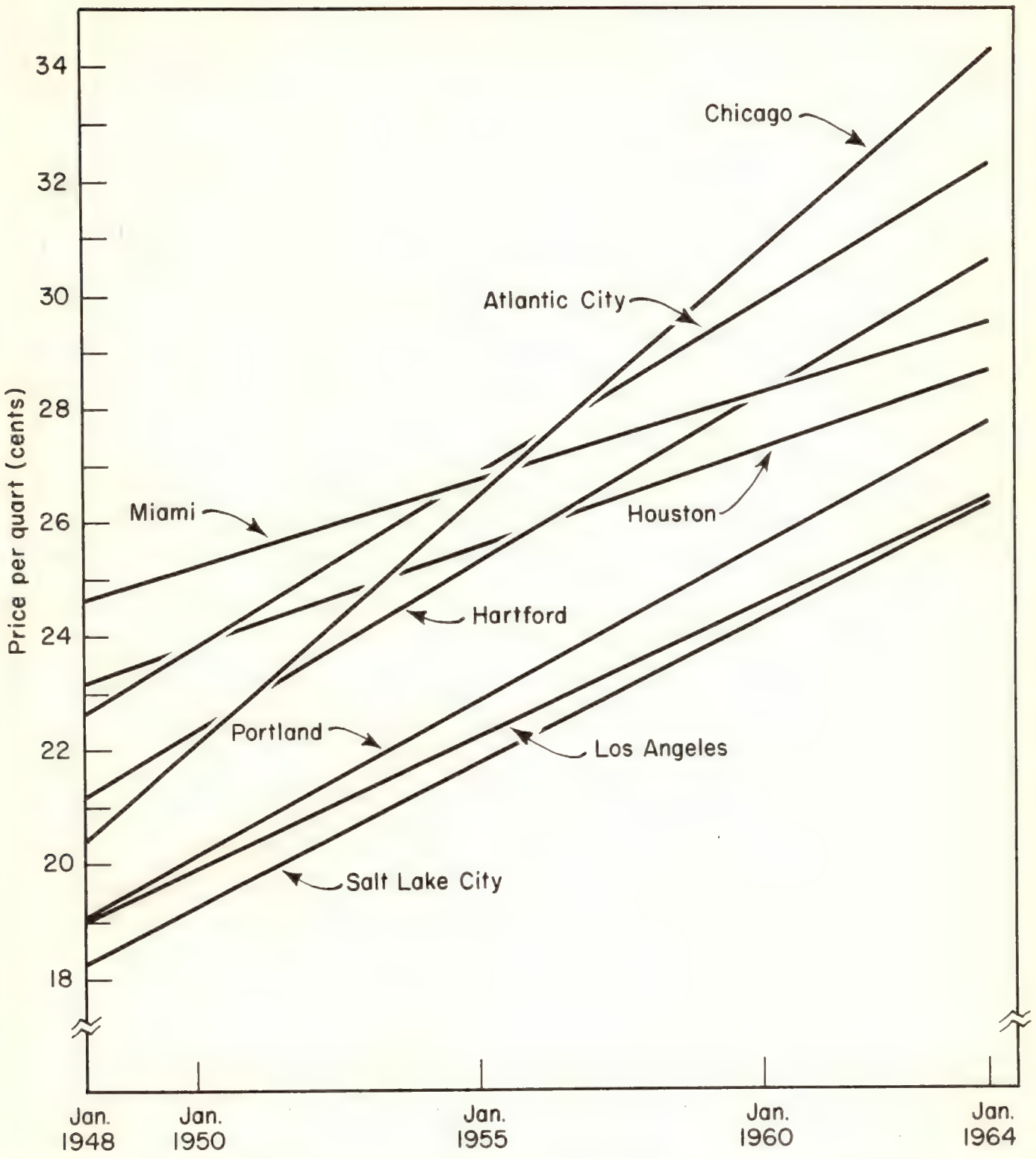

FIGURE 4. Linear Trends of Consumer Home-Delivered Prices for Fluid Milk Selected Markets, 1948 - 1964

Source: Data for least-sqares estimation of linear trends were obtained from U.S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948 — May, 1964, monthly issues, Table 1.

TABLE 6

Trends in Consumer Home-Delivered Prices for Fluid Milk, Selected Milk Markets
United States, January, 1948-May, 1964

Market	Average price[a/]	Regression results[b/]		
		Constant term $\hat{a}$	Trend coefficient $\hat{b}$	Coefficient of determination r^2
	cents per quart			
Los Angeles	22.8	19.0	+.039**	.85
Chicago	27.5	20.4	+.072**	.96
Houston	26.0	23.2	+.028**	.65
Hartford	26.0	21.2	+.049**	.84
Salt Lake City	22.4	18.3	+.042**	.92
Portland	23.5	19.0	+.045**	.93
Atlantic City[c/]	27.6	22.7	+.050**	.93
Miami	27.2	24.7	+.025**	.77

a/ Simple average over entire time period.

b/ Computed on assumption of linear trend:

$$p_t = \hat{a} + \hat{b}t + \hat{e}_t$$

where

$\hat{a}$ = general level of prices at the start of the period

$\hat{b}$ = average increase (+) or decrease (-) in price per month

$\hat{e}_t$ = portion of observed price which is not associated with the linear trend in price = $p_t - \hat{a} - \hat{b}t$

and

r^2 = coefficient of determination.

Values for $\hat{a}$ and $\hat{b}$ were obtained by least-squares regression.

c/ Based on 184 observations. Average price computed is the trend value for the middle month of the entire period.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

TABLE 7

Trends in Processor Margins for Fluid Milk, Selected Milk Markets
United States, January, 1948-May, 1964

Market	Average margin[a]	Regression results[b]		
		Constant term $\hat{a}$	Trend coefficient $\hat{b}$	Coefficient of determination r^2
	cents per quart			
Los Angeles	7.7	5.2	+.026**	.93
Chicago	12.6	8.9	+.037**	.84
Houston[c]	8.0	4.8	+.033**	.78
Hartford	9.2	5.8	+.035**	.74
Salt Lake City	7.7	4.3	+.034**	.91
Portland	8.5	5.6	+.029**	.89
Atlantic City[c]	11.6	8.8	+.028**	.88
Miami[c]	9.4	7.4	+.020**	.81

a/ Simple average over entire time period.

b/ Computed on assumption of linear trend:

$$p_t = \hat{a} + \hat{b}t + \hat{e}_t$$

where

$\hat{a}$ = general level of margins at the start of the period

$\hat{b}$ = average increase (+) or decrease (-) in margin per month

$\hat{e}_t$ = portion of observed margin which is not associated with the linear trend in margin = $p_t - \hat{a} - \hat{b}t$

and

r^2 = coefficient of determination.

Values for $\hat{a}$ and $\hat{b}$ were obtained by least-squares regression.

c/ Based on fewer than 197 observations: Houston, 182; Miami, 152; and Atlantic City, 184. The average margin computed for these markets is the trend value for the middle month of the entire period.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

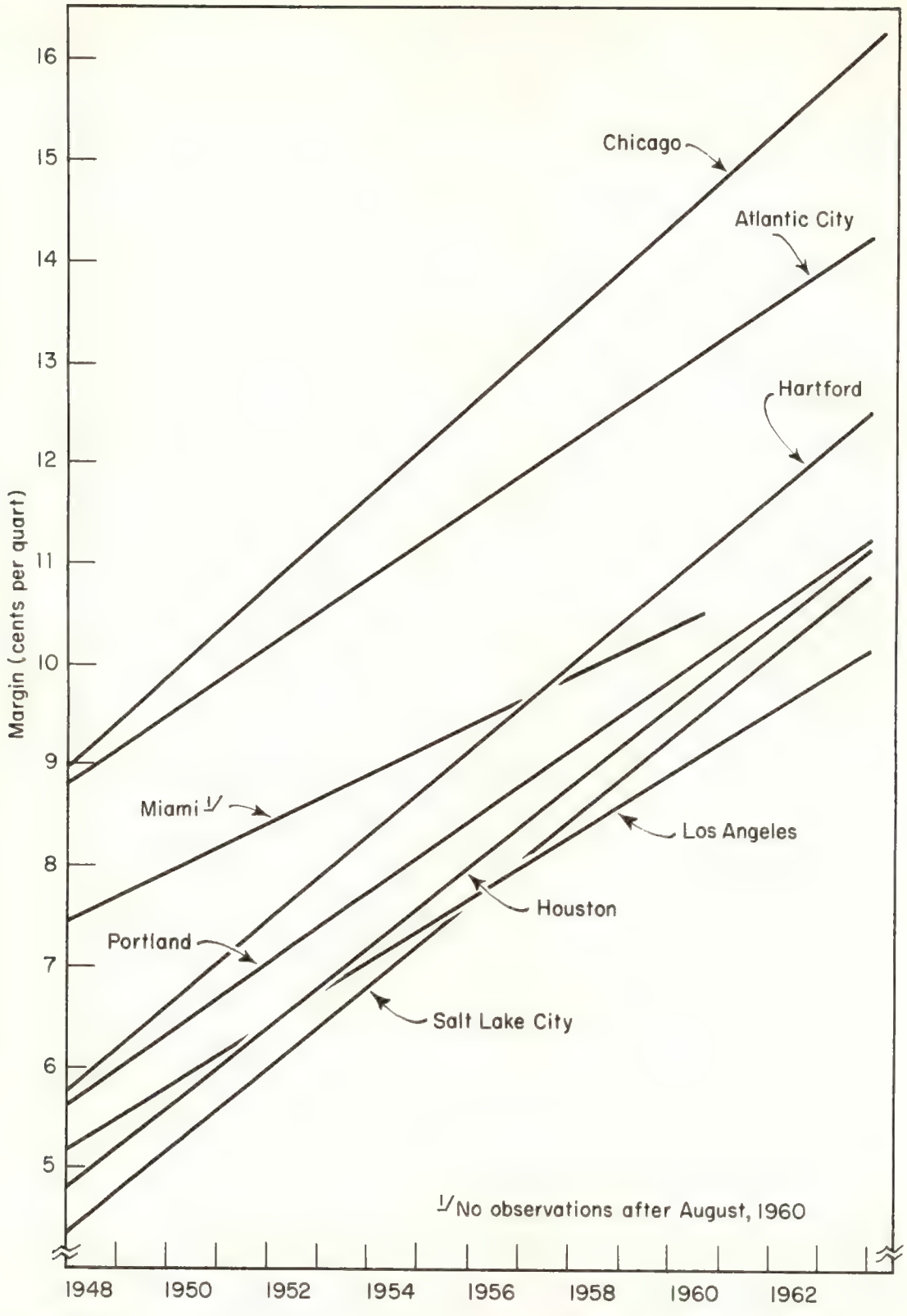

FIGURE 5. Linear Trends of Processor Margins for Fluid Milk, Selected Markets, 1948-1964

Source: Data for least-squares estimation of linear trends were obtained from U.S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948 — May, 1964, monthly issues, Table 1.

quart. Margins in Chicago, on the other hand, varied markedly but were generally higher than in any other market. The month-to-month variation in the Chicago market converged to almost a constant margin beginning in early 1962. From the data, of course, it is not possible to tell whether this is an equilibrium margin or whether this margin is highest because the marketing system in Chicago is more inefficient or whether it is highest because the processors have more bargaining power and thus reap some monopoly profits.

Regardless of the causes for the differences, there is no evidence to indicate that processor margins in Los Angeles are out of line with any of the other markets in terms of their effect on consumer prices.

Store Margins

Store margins for milk sold in quart containers in Los Angeles averaged 2.2 cents per quart over the entire period studied. Higher average margins occurred in two markets, Salt Lake City and Houston, and lower average margins occurred in four markets, with a range from 2.1 cents to 1.1 cents per quart (Table 8). Linear trend lines fit to the monthly data indicate extreme differences among markets in the general level of margins at the beginning and end of the 16-year period (Figure 6). Margins in Los Angeles started at the higher end of the range at 2.4 cents per quart and ended at the middle of the range at about 2 cents per quart. Chicago ended at the low end near 1/2 cent per quart, and Atlantic City, with a large rate of increase, ended the period near 4 cents per quart. For all markets, however, the time trend in store margins has been relatively small. This is reflected in the low r^2 values obtained for the fitted regression line.

From this analysis, it would appear that store margins in Los Angeles are not out of line with store margins in other markets, and they have been

TABLE 8

Trends in Store Margins for Fluid Milk, Selected Milk Markets
United States, January, 1948-May, 1964

Market	Average margin[a]	Regression results[b]		
		Constant term $\hat{a}$	Trend coefficient $\hat{b}$	Coefficient of determination r^2
	cents per quart			
Los Angeles	2.2	2.4	-.0025**	.28
Chicago	1.1	1.7	-.0060**	.07
Houston[c]	2.3	2.9	-.0058**	.04
Hartford	1.8	2.7	-.0085**	.25
Salt Lake City	2.4	1.7	+.0065**	.50
Portland	1.8	1.8	+.0001	.00[d]
Atlantic City[c]	2.1	0.2	+.0190**	.21
Miami[c]	2.2	1.9	+.0024**	.07

a/ Simple average over entire time period.

b/ Computed on assumption of linear trend:

$$p_t = \hat{a} + \hat{b}t + \hat{e}_t$$

where

$\hat{a}$ = general level of margins at the start of the period

$\hat{b}$ = average increase (+) or decrease (-) in margin per month

$\hat{e}_t$ = portion of observed margin which is not associated with the linear trend in margin = $p_t - \hat{a} - \hat{b}t$

and

r^2 = coefficient of determination.

Values for $\hat{a}$ and $\hat{b}$ were obtained by least-squares regression.

c/ Based on fewer than 197 observations: Houston, 110; Atlantic City, 130; and Miami, 152. The average margin computed for these markets is the trend value for the middle month of the entire period.

d/ Actual value, 0.00053.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

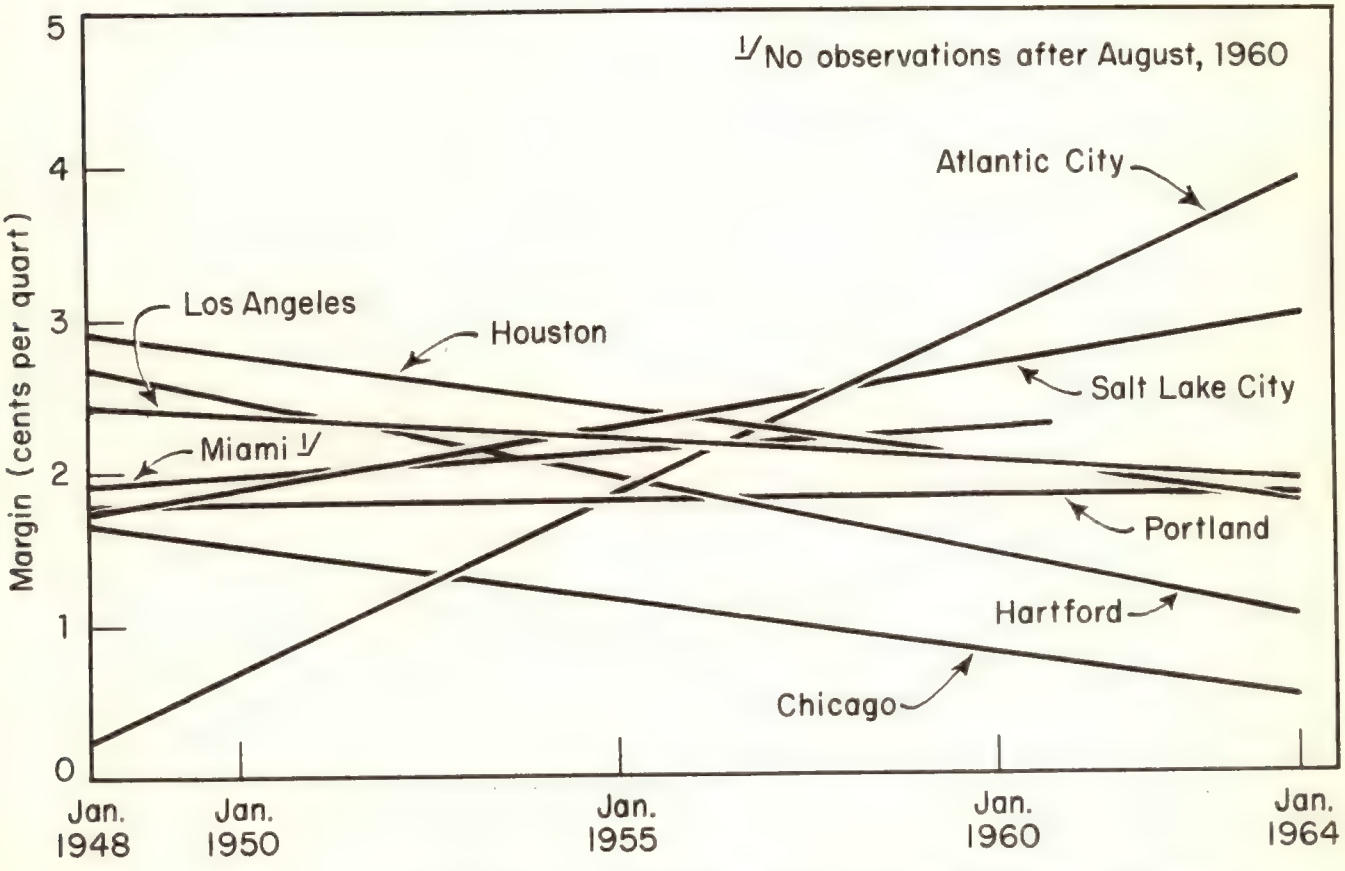

FIGURE 6. Linear Trends of Store Margins for Fluid Milk, Selected Markets, 1948 — 1964

Source: Data for least-squares estimation of linear trends were obtained from U.S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948 — May, 1964, monthly issues, Table 1.

more stable over time. Store margins in Los Angeles and Portland have been almost the same; but store margins in some markets have been extremely variable, for example, Chicago, Atlantic City, Houston, and, during recent years, Hartford.

The store margins discussed for Los Angeles do not include the discounts granted by processor to store, nor do they reflect discounts in the other regulated or unregulated markets. However, to the extent different types of services are performed by the stores and processors in the several markets, these margins do reflect the effects of these differences. It should also be noted that the lack of information in the Atlantic City market makes the trend line for that market somewhat unrealistic but indicative of considerable shifting over the period considered.

The large wholesale price discounts granted in the Los Angeles market started with none in 1956[29/] and gradually increased to 12 percent for large volume deliveries with normal service.[30/] This lower cost to large stores has not been passed on to consumers because of the uniform minimum out-of-store price that has been established for all stores. Therefore, the computed margin underestimates the magnitude of the average store margin for the Los Angeles market since 1956 and especially underestimates the margin available to large supermarkets.

Price Stability[31/]

Stabilization of market conditions is usually an objective of milk market regulatory programs. Comparisons of the magnitude and frequency of price changes among markets have been made in order to measure and evaluate relative market stability. Three different indices have been developed to quantify these price variations.

One index measures the frequency of price changes. If the price seldom changes, the price level is stable, but the system is rigid. Very few changes may reflect an inability of the system to reflect changes in the economic factors affecting price. On the other hand, frequent changes may reflect an unstable market situation.

A second index measures the average magnitude of relative price changes. If price changes are relatively large and frequent, this can reflect an unstable marketing situation in which the system has difficulty determining the appropriate price level consistent with long-run conditions of supply and demand.

A third index measures the amount of deviation from the linear trend line developed previously. If this linear trend line indicates the general direction and level of price that will exist over the long run, then the monthly deviations from this trend line can be interpreted as the degree of instability due to short-run economic and institutional aberrations.

Frequency of Price Changes

This index reflects the proportion of months in which prices were different from the previous month. The smaller the value of the index, the less frequently change has occurred, or the more stable is price. For example, as shown in Table 9, producer prices in Los Angeles changed from one month to the next in 11 percent of (total number of) the months analyzed, the lowest frequency of change for any market. Resale prices, on the other hand, changed more frequently in Los Angeles than in Salt Lake City (a market with no resale price control), Portland, and Miami (markets that had resale control part of the period). But compared with Chicago, Houston, and Atlantic City, Los Angeles consumer prices changed least frequently.

According to this measurement, prices at all levels of trade were most unstable in Chicago and Hartford--markets with government pricing at the

TABLE 9

Frequency of Change in Prices for Fluid Milk, Selected Milk Markets United States, January, 1948-May, 1964[a/]

Market	Producer Class I	Wholesale	Store	Home delivered
	percent			
Los Angeles	11	13	15	11
Chicago	63	34	37	25
Houston	17	21[b/]	23	14
Hartford	32	30	31	27
Salt Lake City	17	11	9	10
Portland	22	8	8	8
Atlantic City	20	21[c/]	15	19[c/]
Miami	27	7[d/]	8	8

a/ Computed as $100 \times \frac{N}{T}$

where

N = number of months in which the price was different from the previous month

and

T = total number of months.

b/ 182 observations.

c/ 184 observations.

d/ 152 observations.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

producer level and no resale price control. It should be noted, however, that these markets operated under regulations which incorporated seasonal price differences.

Average Magnitude of Price Changes

This index reflects the average monthly percentage change in price. For example, the producer Class I price in Los Angeles changed an average of 0.6 percent per month, while the Chicago price changed 2.5 percent per month (Table 10).

On an overall basis, the average magnitude of price change in Los Angeles was either the smallest or almost the smallest compared with other markets at all levels of trade. Miami and Portland had somewhat less variation in consumer home-delivered prices, and only Miami had significantly smaller price variations at the wholesale level.

Deviation from Long-Run Trend Line

This index expresses the standard deviation of the observed prices from the computed trend line in terms of a percentage of the average price.[32/] The standard deviation provides a measure of the dispersion of observed values above and below the trend line. The larger the value of this index, the greater is the variability of prices from the long-term movement.

According to this measure, Class I prices in Los Angeles appear to be no more stable than most of the other markets studied (Table 11). Producer prices stayed closer to the trend line in five of the other seven markets, with only Chicago and Portland prices deviating farther from the trend line. The index of deviation for resale prices (wholesale, store, and home delivered) in Los Angeles is about in the middle of the range of the measurements for the other markets.

TABLE 10

Average Magnitude of Change in Prices for Fluid Milk, Selected Milk Markets United States, January, 1948-May, 1964[a/]

Market	Producer Class I	Wholesale	Store	Home delivered
	percent			
Los Angeles	0.6	0.5	0.4	0.4
Chicago	2.5	1.4	1.4	0.7
Houston	1.1	1.1[b/]	0.5	0.7
Hartford	1.5	1.4	1.4	1.1
Salt Lake City	0.5	0.4	0.4	0.4
Portland	1.1	0.4	0.4	0.3
Atlantic City	1.2	0.8[c/]	1.1	0.6[c/]
Miami	0.5	0.2[d/]	0.4	0.3

a/ Computed as

$$\left(\frac{1}{T-1} \sum_{t=2}^{T} \frac{P_t - P_{t-1}}{\max P_t, P_{t-1}} \right) \times 100$$

where

P = price in month t

and

t = (1, ..., T).

b/ 182 observations.

c/ 184 observations.

d/ 152 observations.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

TABLE 11

Index Based on Deviation from Trend Line in Prices for Fluid Milk
Selected Milk Markets, United States, January, 1948-May, 1964[a/]

Market	Producer Class I	Wholesale	Store	Home delivered
	percent			
Los Angeles	5.9	4.1	3.8	4.0
Chicago	9.2	6.4	6.4	3.2
Houston	5.7	6.2[b/]	6.0	4.5
Hartford	5.5	6.3	7.5	4.7
Salt Lake City	5.3	3.7	2.8	3.1
Portland	8.2	3.4	3.8	2.9
Atlantic City	5.0	3.5[c/]	7.0	2.7[c/]
Miami	2.5	2.3[d/]	3.3	2.9

a/ Computed as

$$\left(\frac{\sqrt{\frac{1}{T} \sum_{t=1}^{T} \hat{e}_t^2}}{\frac{1}{T} \sum_{t=1}^{T} P_t} \right) \times 100$$

where

$\hat{e}_t = P_t - \hat{a} - \hat{b}t$

t = month ($t=1, \ldots, T$)

and

P = price in month t.

b/ 182 observations.

c/ 184 observations.

d/ 152 observations.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

While the previous indices indicated Los Angeles prices as the most stable, this index indicates that they are only more stable in terms of the frequency of change and the magnitude of change. Essentially, this means that the Los Angeles prices move, or are moved, via order amendments in systematic steps which adjust gradually to long-run economic and political pressures. Short-run instability or fluctuations are reduced but in the long run price variation has been little different from the average in other markets.

It would appear that the removal of some of the price variations and, thus, the removal of some degree of uncertainty may be the reason why prices have been persistently lower in Los Angeles than in the other markets. This is obviously a conjectural statement, but it is one of the several possible logical explanations.

Margin Stability

Margins in the selected markets were subjected to two of the tests used to measure price stability.[33/]

As shown in Table 12, processor margins deviated least from the trend line in Los Angeles, Miami, and Atlantic City. However, since some data were missing for the latter two markets, actual deviation has probably been underestimated. Therefore, it is reasonable to state that processor margins in the Los Angeles market deviated from the long-run trend line less than any other market studied. Processing margins deviated most in Houston and Hartford.

Store margins in Los Angeles also showed the least deviation from trend, while they deviated markedly in Chicago, Atlantic City, Houston, and Hartford.

The margins or price spreads are determined and specified by the California regulatory agency and used to establish the level of minimum prices. Since minimum prices have been the effective price over almost the entire

TABLE 12

Index Based on Deviation from Trend Line and Frequency of Change in Margins for Fluid Milk, Selected Milk Markets, United States January, 1948-May, 1964

Market	Deviation from trend[a/]		Frequency of change[b/]	
	Processor margin	Store margin	Processor margin	Store margin
	percent			
Los Angeles	5.0	10.7	11	11
Chicago	7.4	119.0	66	25
Houston	12.8[c/]	51.8[d/]	20[c/]	25[d/]
Hartford	12.7	45.7	38	35
Salt Lake City	8.0	15.5	23	11
Portland	7.0	14.3	23	4
Atlantic City	4.7[e/]	74.4[f/]	24[e/]	15[f/]
Miami	4.7[g/]	18.0[g/]	19[g/]	9[g/]

a/ Computed as

$$\left(\sqrt{\frac{\frac{1}{T} \sum_{t=1}^{T} \hat{e}_t^2}{\frac{1}{T} \sum_{t=1}^{T} P_t}} \right) \times 100$$

where

$$\hat{e}_t = P_t - \hat{a} - \hat{b}t.$$

b/ Computed as $\frac{N}{T}$

where

N = number of changes

and

T = total number of months.

(Continued on next page.)

TABLE 12--continued.

c/ 182 observations.

d/ 110 observations.

e/ 184 observations.

f/ 130 observations.

g/ 152 observations.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, monthly issues.

period under study, the above results are obvious and expected. Margins were changed about 20 times during the period as reflected by the 11 percent frequency of change shown for Los Angeles.[34/] Thus, margins or price spreads, especially store margins, have been more stable in California markets than in other markets considered.

CONCLUSIONS

Throughout the 16-year period covered by this analysis (1948-1964), producers in California have generally received higher prices for milk used for fluid consumption than have producers supplying the Chicago market.[35/] Relative to the other six markets studied, however, Class I prices paid producers in Los Angeles have been the lowest. The tendency throughout the period has been for price differences among all the markets to become smaller. Over the years, producer prices changed less frequently and in smaller amounts in Los Angeles but, relative to long-term changes or trends, were no more stable than prices in most of the other markets. The exceptions were Chicago and Hartford, both under a federal order program, which had the most unstable prices at the producer level.

The effect of the California milk control program on the overall level of minimum Class I prices does not appear to be significantly different from the expected effect of a federal order program nor does it differ much from the expected level if prices were totally unregulated by government. However, it appears that state control programs and joint federal-state programs in other states effectively increased producer prices above those under the federal order program and the California program.

Over the 16-year period studied, milk prices to consumers in Los Angeles were generally lower than in the other seven markets studied. Consumer prices

in the Los Angeles market changed less frequently and in smaller amounts and, relative to long-run trends, were more stable. This conclusion holds both for milk purchased at stores and for milk delivered to the home.

In fact, the California resale price control program appears to influence consumer prices for milk in quart containers downward relative to price levels that would be expected under a federal order program, under other state order programs, or under joint federal-state programs. Store prices for milk in half gallon containers were significantly lower than those which might be expected under the other programs. Although some difference was measured in the analysis, store prices for milk under California regulations were not significantly different statistically from those observed in nonregulated markets.

Processor margins, or the spread between price paid and price received by fluid milk processors and distributors, have been consistently smaller in California markets than in the other seven markets studied. Although the trend was upward during the entire period analyzed, California margins were still lowest at the end of the period.

The frequency of change and the deviation from the trend line were also smallest in California markets. This stability of margins reduces or eliminates uncertainty and may partly explain why the processing segment of the industry has been willing to accept the lower margins.

From the cross-sectional analysis, it appears that the smaller margin in California results from or is associated with the operation of the type of regulatory program in effect.

Whether or not the combination of a more stable but smaller margin results in more or less profit cannot be determined from this type of analysis. Many other factors influence the profit rate of individual firms. The price spreads

on other dairy products, processed or handled, have a bearing on the willingness of processors to continue processing fluid milk at any specific price spread.

Average store margins for Los Angeles fell somewhere near the middle of the range observed for the eight markets studied. Furthermore, the rate of increase in margins and the frequency of change also were about midway in the observed range. However, deviations from the trend line were smaller in Los Angeles than in any of the other seven markets.

On the basis of these findings, the performance of this sector of the industry in California appears to be reasonably in line with the other sectors. However, it does seem inconsistent that prices and processor margins are lower under California-type regulation and apparently influenced downward but that store margins have been permitted to remain higher than occurred in some of the other markets. It is possible that this condition may be unique, for the cross-sectional analysis indicates that California store margins on half gallons are somewhat higher than what one would expect if the market were under any of the other existing types of regulation or if resale prices were not subject to government regulation.

APPENDIX TABLE 1

Effect of Type of Market Regulation, Geographic Location, and Population on Producer Class I Prices in Fluid Milk Markets United States, January, Selected Years

Independent variable	Effect on producer Class I price				
	1955	1964	1965	1966	Combined[a/]
	cents per quart				
Regulation					
Federal-state	2.634**	0.160	0.547	0.901**	0.561**
State (California excluded)	2.189**	0.843**	1.155**	0.890**	0.956**
Unregulated	0.287	0.663*	-0.023	-0.175	0.237
California	-0.442	0.469	0.260	0.202	0.244
Region					
New England	1.838**	3.433**	3.270**	3.450**	3.351**
Middle Atlantic	1.607**	3.084**	2.608**	1.860**	2.495**
West North Central	0.419	-0.471	0.008	-0.347	-0.271
South Atlantic	3.335**	3.514**	3.093*	2.804**	3.187**
East South Central	1.705**	2.376**	2.276**	1.762**	2.130**
West South Central	3.565**	2.743**	2.822**	2.369**	2.658**
Mountain	1.671	1.495**	1.662**	1.413**	1.514**
Pacific	1.732**	1.274**	1.441**	0.968**	1.302**
Population					
Per thousand	0.00015	0.00010	0.00008	0.00003	0.00007
Constant term	9.007	9.686	9.753	10.395	10.103
R^2 (100)	80.8	80.7	82.2	78.2	78.9
Number of markets	105	133	133	135	401

(Continued on next page.)

APPENDIX TABLE 1--continued.

a/ Data for the years 1964, 1965, and 1966 were combined in order to test the hypothesis that the effects of population, type of regulation, and region were equal for each year; that is, in order to test the hypothesis that $B_{64} = B_{65} = B_{66} = B$, where B represents vectors of parameters of the explanatory variables. Based on an F test, the above hypothesis was not rejected. Thus, the combined analysis provides as good an indication of these relationships as does separate analysis.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1955, 1964, 1965, and 1966.

APPENDIX TABLE 2

Effect of Type of Market Regulation, Geographic Location and Population on Consumer Store Prices (Quarts) in Fluid Milk Markets, United States January, Selected Years

Independent variable	Effect on consumer store price		
	1955[a/]	1964[b/]	1965[b/]
	cents per quart		
Regulation			
Federal-state	1.351	-1.018	-0.443
State (California excluded)	1.088*	-0.812*	-0.707
Unregulated	-0.597	-0.946**	-1.129**
California	-0.881	-2.100**	-3.130**
Region			
New England	1.133	2.380**	2.916**
Middle Atlantic	1.833**	2.887**	2.714**
West North Central	-0.754	-1.091**	-0.686
South Atlantic	2.803**	4.289**	4.856**
East South Central	1.791**	2.970**	2.835**
West South Central	3.292**	3.488**	3.594**
Mountain	0.126	1.799**	2.187**
Pacific	-0.221	1.944**	3.098**
Population			
Per thousand	0.00007	0.00018	0.00029
Constant term	21.186	23.394	24.054
R^2 (100)	68.2	65.6	60.0
Number of markets	127	135	157

a/ Data for 1955 applies to one-quart glass containers.

b/ Data for 1964 and 1965 applies to one-quart paper containers.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1955, 1964, and 1965.

APPENDIX TABLE 3

Effect of Type of Market Regulation, Geographic Location, and Population on Consumer Store Prices (Half Gallons) in Fluid Milk Markets United States, January, Selected Years

Independent variable	Effect on consumer store price			
	1964	1965	1966	Combined[a/]
	cents per quart			
Regulation				
Federal-state	1.256	1.476*	1.721*	1.540**
State (California excluded)	1.529**	1.703**	1.371**	1.545**
Unregulated	0.493	-0.681	-0.490	-0.242
California	-0.699	-1.290	-1.565	-1.300*
Region				
New England	1.810**	2.730**	3.200**	2.647**
Middle Atlantic	2.843**	2.942**	2.304**	2.672**
West North Central	0.156	0.988*	1.060*	0.798**
South Atlantic	4.405**	5.146**	5.649**	5.136**
East South Central	3.194**	3.098**	3.236**	3.140**
West South Central	3.452**	3.979**	3.876**	3.831**
Mountain	2.793**	3.573**	3.355**	3.284**
Pacific	3.254**	4.287**	3.868**	3.946**
Population				
Per thousand	0.00008	0.00012	0.00021	0.00014
Constant term	21.364	20.855	21.122	21.231
R^2 (100)	62.8	64.0	59.7	60.9
Number of markets	138	159	166	463

a/ Data for the years 1964, 1965, and 1966 were combined in order to test the hypothesis that the effects of population, type of regulation, and region were equal for each year; that is, in order to test the hypothesis that $B_{64} = B_{65} = B_{66} = B$, where B represents vectors of parameters of the explanatory variables. Based on an F test, the above hypothesis was not rejected. Thus, the combined analysis provides as good an indication of these relationships as does separate analysis.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1964, 1965, and 1966.

APPENDIX TABLE 4

Effect of Type of Market Regulation, Geographic Location and Population on Processor Margins (Quarts) in Fluid Milk Markets, United States January, Selected Years

Independent variable	Effect on processor margin	
	1955[a/]	1964[b/]
	cents per quart	
Regulation		
Federal-state	-0.559	-0.746
State (California excluded)	-0.474	-1.478**
Unregulated	-1.011**	-0.977
California	-1.201	-2.610**
Region		
New England	-1.166	-0.278
Middle Atlantic	0.130	0.723
West North Central	-0.796	-1.243*
South Atlantic	-0.224	0.955
East South Central	0.287	1.348
West South Central	-0.321	0.212
Mountain	-1.570	-0.413
Pacific	-1.082	1.287
Population		
Per thousand	0.00008	0.00033*
Constant term	9.563	11.645
R^2 (100)	31.8	26.6
Number of markets	99	121

a/ Data for 1955 applies to one-quart glass containers.

b/ Data for 1964 applies to one-quart paper containers.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1955 and 1964.

APPENDIX TABLE 5

Effect of Type of Market Regulation, Geographic Location, and Population on Processor Margins (Half Gallons) in Fluid Milk Markets United States, January, Selected Years

Independent variable	Effect on processor margin			
	1964	1965	1966	Combined[a/]
	cents per quart			
Regulation				
Federal-state	1.033	0.678	0.633	0.871*
State (California excluded)	0.530	0.391	1.090**	0.663**
Unregulated	0.086	-0.165	0.319	-0.097
California	-1.862*	-2.284*	-1.211	-1.970**
Region				
New England	-1.890**	-0.119	-0.335	-0.976*
Middle Atlantic	-0.620	1.423	0.174	0.241
West North Central	-0.797	0.717	0.870	0.153
South Atlantic	-0.030	2.270**	1.303*	1.108**
East South Central	-0.379	0.591	0.733	0.155
West South Central	-0.311	1.443*	1.239*	0.679
Mountain	0.044	1.143	0.545	0.520
Pacific	1.598*	3.428**	3.152	2.673**
Population				
Per thousand	0.00025	0.00028	-0.00008	0.00022*
Constant term	10.238	8.912	8.928	9.303
R^2 (100)	21.3	30.6	36.1	23.8
Number of markets	122	115	103	340

a/ Data for the years 1964, 1965, and 1966 were combined in order to test the hypothesis that the effects of population, type of regulation, and region were equal for each year; that is, in order to test the hypothesis that $B_{64} = B_{65} = B_{66} = B$, where B represents vectors of parameters of the explanatory variables. Based on an F test, the above hypothesis was not rejected. Thus, the combined analysis provides as good an indication of these relationships as does separate analysis.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1964, 1965, and 1966.

APPENDIX TABLE 6

Effect of Type of Market Regulation, Geographic Location and Population on Store Margins (Quarts) in Fluid Milk Markets, United States January, Selected Years

Independent variable	Effect on store margin	
	1955a/	1964b/
	cents per quart	
Regulation		
Federal-state	-0.125	-0.361
State (California excluded)	-0.328	-0.277
Unregulated	-0.029	-0.572
California	0.591	0.173
Region		
New England	-0.044	-0.484
Middle Atlantic	-0.365	-0.926
West North Central	-0.471*	0.591
South Atlantic	-0.445*	-0.218
East South Central	0.124	-0.651
West South Central	0.278	0.451
Mountain	0.423	0.512
Pacific	0.844**	-0.634
Population		
Per thousand	-0.00003	-0.00031*
Constant term	2.624	3.066
R^2 (100)	25.6	18.8
Number of markets	119	127

a/ Data for 1955 applies to one-quart glass containers.

b/ Data for 1964 applies to one-quart paper containers.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1955 and 1964.

APPENDIX TABLE 7

Effect of Type of Market Regulation, Geographic Location, and Population on Store Margins (Half Gallons) in Fluid Milk Markets
United States, January, Selected Years

Independent variable	Effect on store margin			
	1964	1965	1966	Combined[a/]
	cents per quart			
Regulation				
Federal-state	0.603	0.102	-0.274	0.119
State (California excluded)	0.559	0.206	-0.457	0.070
Unregulated	0.275	0.494	-0.011	0.268
California	1.074	0.888	0.288	0.832
Region				
New England	-0.279	-0.401	-0.126	-0.203
Middle Atlantic	-0.208	-1.003	-0.126	-0.434
West North Central	1.192**	0.427	0.425	0.719**
South Atlantic	-0.127	0.123	0.898*	0.336
East South Central	0.561	0.188	0.536	0.491
West South Central	0.369	-0.352	0.064	0.059
Mountain	0.598	0.793	0.851	0.779*
Pacific	-0.260	-0.805	-0.908	-0.676
Population				
Per thousand	-0.00031*	-0.00021	-0.00016	-0.00024**
Constant term	1.794	2.203	2.445	2.324
R^2 (100)	24.5	17.9	19.3	16.8
Number of markets	128	137	127	392

a/ Data for the years 1964, 1965, and 1966 were combined in order to test the hypothesis that the effects of population, type of regulation, and region were equal for each year; that is, in order to test the hypothesis that $B_{64} = B_{65} = B_{66} = B$, where B represents vectors of parameters of the explanatory variables. Based on an F test, the above hypothesis was not rejected. Thus, the combined analysis provides as good an indication of these relationships as does separate analysis.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Source: U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1964, 1965, and 1966.

APPENDIX TABLE 8

Number of Markets and Type of Market Regulation Included in the Various Analyses of Prices and Margins, United States, Selected Years

Year and type of regulation	Producer Class I price	Store price	Store price	Processor margin		Store margin	
		Quart	Half gallon	Quart	Half gallon	Quart	Half gallon
	number of markets						
1955							
California	6	6		6		6	
State (other)	29	34		29		34	
Federal-state	4	4		4		5	
Federal order	36	37		52		34	
Unregulated	30	46		28		40	
1964							
California	6	6	6	6	6	6	6
State (other)	24	26	25	23	23	25	24
Federal-state	8	9	8	8	7	9	8
Federal order	74	72	68	66	67	65	68
Unregulated	21	23	23	18	19	22	22
1965							
California	6		6		6		6
State (other)	30		34		28		34
Federal-state	8		9		8		9
Federal order	77		71		63		70
Unregulated	12		18		10		18
1966							
California	6		6		6		6
State (other)	27		30		26		30
Federal-state	8		9		7		9
Federal order	82		62		53		62
Unregulated	12		20		11		20

Source: Calculated.

FOOTNOTES

1/ California, Agricultural Code (1965), Div. 6, Chaps. 16 and 17. Price setting is the responsibility of the California Director of Agriculture, functioning through the Bureau of Milk Stabilization. This agency also has the responsibility of enforcing the sections of the Agricultural Code which prohibit "unfair trade practices," such as secret rebates, services below costs, and unearned discounts.

2/ The following excerpt summarizes the legislative intent and objectives (ibid., Div. 6, Chap. 17):

> ". . . to insure an adequate and continuous supply of pure, fresh, wholesome fluid milk and cream to consumers thereof at fair and reasonable prices . . . enabling the dairy industry . . . to correct existing evils, develop and maintain satisfactory marketing conditions, and bring about and maintain a reasonable amount of stability and prosperity in the production and marketing . . . nothing in this chapter shall be construed as permitting or authorizing the development of conditions of monopoly in the production or distribution of fluid milk and cream."

3/ Richard E. Caves, "Direct Regulation and Market Performance in the American Economy," American Economic Review, Vol. LIV, No. 3 (May, 1964), pp. 172-181.

4/ The month of January was selected on the basis that it is affected less by seasonal price plans, holidays, or other market conditions which may vary from one year to the next.

5/ Geographical location is included in the statistical analysis on the assumption that demand and supply conditions are homogeneous within each region.

6/ Analysis of covariance is a procedure in which some factors are treated qualitatively and some are treated quantitatively. It differs from regression analysis in which all factors are quantitative and are treated quantitatively. Covariance analysis also differs from analysis of variance in which all factors are treated qualitatively.

7/ U. S. Department of Agriculture, Statistical Reporting Service, Fluid Milk and Cream Report, January, 1948-May, 1964, January, 1965, and January, 1966.

8/ Net as used here means net of the variations associated with or related to size and geographic location of market.

9/ For breakdown of number of markets studies by year and type of regulation, see Appendix Table 8, p. 58.

10/ Several analytical models, which included average hourly wage rates of industrial workers and/or average weekly earnings of retail workers as quantitative variables, were tried in order to consider the effect of wage rates on prices and margins in the various markets. The effect of wages, as reflected by these aggregated data, were not statistically significant, and the coefficients were in general of opposite sign from that which would reasonably be expected. Therefore, these variables were excluded from the final analyses.

11/ U. S. Bureau of the Census, U. S. Census of Population: 1950. Vol. I, Number of Inhabitants, 1952.

Idem, U. S. Census of Population: 1960. Vol. 1, Characteristics of the Population. Part A, Number of Inhabitants, 1961.

12/ The urbanized area is characterized as the physical city and is distinguished from both the legal city and the metropolitan community. In most cases, the urbanized areas can be considered as smaller than standard metropolitan statistical areas.

13/ These tests were made by using the S method of multiple comparison. For procedure, see Henry Scheffe, The Analysis of Variance (New York: John Wiley and Sons, Inc., 1959), pp. 66-71 and 207-213.

14/ This involves testing the hypothesis that $B_{64} = B_{65} = B_{66} = B$, where B represents vectors of estimated parameters of the explanatory variables.

15/ Significance tests are based on the S method of multiple comparisons. For reference, see footnote 13. A 95 percent confidence level is utilized when reference is made to statistical significance.

16/ Negotiated Class I prices exist in a number of markets regulated by federal order. In such cases, the negotiated or effective Class I price was used in this study.

17/ It should be noted that the relative importance of store sales in quart containers declined considerably between 1955 and 1965.

18/ The 1964-1966 combined analysis is considered here since the hypothesis that the effect of type of regulation, geographic location, and market size are equal for each of the three years was not rejected on the basis of an F test.

19/ Tests for significant differences between the California-type program and other regulation types were made using the S method of linear contrasts.

20/ Store prices for half-gallon containers were not analyzed for 1955 because this size container was of less importance relative to the latter period. Thus, this statement is based on the analysis of prices for quart containers only.

21/ It should be pointed out that federal orders establish producer prices only. Therefore, processor margins in these markets are essentially "unregulated" in that resale prices are not established by regulation.

22/ R^2 was .318 in 1955 and .266 in 1964. Also, the inclusion of the average industrial wage rate for each market did not improve the explanation of variation in processor margins.

23/ For relevant R^2, see Appendix Tables 6 and 7, pp. 56-57.

24/ Tests of significance are on the basis of the 95 and 99 percent confidence levels.

25/ Based on the same logic, the analysis overstates processors' margins in California.

26/ U. S. Department of Agriculture, Statistical Reporting Service, op. cit.

27/ This information obtained from correspondence with the Administrator of the Florida Milk Commission and from information reported in International Association of Milk Control Agencies, Twenty-Fourth Annual Meeting (Las Vegas, Nevada, September, 1960), pp. 82-85.

28/ Monthly data on prices and margins were plotted for each market for the entire 16-year period. These graphs served as a complement throughout this analysis.

29/ Olan D. Forker and D. A. Clarke, Jr., Changes in Milk Delivery Costs and Volume-Pricing Procedures in California, University of California, Giannini Foundation Research Report No. 236 (Berkeley, 1960), p. 2.

30/ The discount schedule in Los Angeles permits a basic discount of 9 percent on any single delivery in excess of $10 and an additional discount of 3 percent on any single delivery in excess of $100. Another additional discount of 5 percent may be granted for limited service-type delivery (Southern Metropolitan Order Number 9, effective March 8, 1965).

31/ Measures of stability used in this study are based in part on measures presented in Benton F. Massel, "Export Concentration and Fluctuations in Export Earnings: A Cross-Section Analysis," American Economic Review, Vol. LIV, No. 2, Part I (March, 1964), pp. 47-63.

32/ This measure is often referred to as the "coefficient of variation" and is a pure number which is independent of the overall level and the rate of change in a market's prices.

33/ The index of average magnitude of price change was not computed since in some cases its computation would have required division by zero.

34/ Eleven percent of 197 months is approximately 20.

35/ The Chicago market is located in the midst of the major surplus milk producing area of the United States. For this reason, the Class I price would be expected to be lower than the Class I price in the Los Angeles market. This expectation is supported by the cross-sectional analysis of markets discussed earlier in this report (also Appendix Table 1, p. 51).